ECONOMIC PRODUCTS OF INDIA.

A Dictionary of the Economic Products of India. By George Watt, M.B., C.M., C.I.E., assisted by numerous contributors. In six volumes (vol. vi. in four parts), 1889-1893. Published under the authority of the Government of India, Department of Revenue and Agriculture. (Calcutta : Superintendent of Government Printing.)

THE completion of this important work adds enormously to the facilities previously existing for acquiring a knowledge of the vegetable, mineral, and animal products of our Indian empire. The object of the dictionary is to give a complete account of all Indian products that have been in any way utilised by man, however small or trivial the use of them may have been. As a large majority of the products are of vegetable origin, the appointment of a botanist as editor and principal author was essential, and the Government of India may be fairly congratulated on the result.

In the preface to the first volume the author states that he has had "to keep in view a two-fold purpose ; viz. on the one hand to supply scientific information which may be useful to the administrative officer, and on the other to meet the requirements of the reader in search of definite information regarding Indian economics." Whether another purpose was to produce a large book is not stated, but no feature of the work is more conspicuous than that it consists of nine bulky and rather closely-printed volumes.

In general plan the dictionary consists of long and elaborate accounts of the more important articles of commerce produced in India, such as various grains, dyes, oils, tea, cotton, sugar, indigo, wool, silk, &c., and shorter notices of less valuable products. As a general rule each vegetable product is described under the scientific name of the plant from which it is obtained, cross references being supplied where necessary under English and Indian terms, and also under general headings, such as " Oils and Fats," " Timbers," &c. Animal and mineral products are described under various headings. A general index is promised, and is needed, for many important English and vernacular terms are not found in their places. For instance, silk-cotton, semul, jowári and juári, bájra, cholum, cumboo, charas, ganja, ngápi, civet (and Viverra) may be searched for in vain. Tasar is inserted, but there is no reference to tusser or tussah, the common spelling, in the place where these words would come in alphabetical sequence. The article on isinglass is slightly out of its proper place, and that on sharks' fins and fish maws, to which reference is made under both isinglass and fish, appears to have been omitted.

Each article, in the case of vegetable products, consists of the scientific name of the plant, with references, the English name, if one exists, and a list of vernacular names, followed by full references to the works, scientific or economic, in which the plant or its products have been described. Then follow paragraphs on the habitat, history and useful products, such as dyes, fibres, oils, gums, &c., each under a separate heading. Sometimes a paragraph explains the chemical composition. Under additional headings are related the uses to which the plant or its products are put in medicine, food, or the arts, and to the paragraph on medicine another is frequently added with "special opinions" by various medical officers. In the case of trees the structure of the wood receives special notice. The last paragraph of each article describes the " domestic and sacred uses." With mineral and animal products the plan is similar, but details are given, as a rule, under general headings, such as horns, skins, wool, iron, &c. In the first volume a botanical diagnosis of each plant is generally added, but not in the later volumes. A number for each separate product or use is inserted in the margin to facilitate reference, the numbers commencing afresh under each letter of the alphabet.

The longer articles contain full descriptions of cultivation, trade, manufactures, and other important subjects.

Whilst the bulk of the work is by Mr. Watt, many articles have been contributed, partly or wholly, by other writers. The list of contributors affixed to the first volume refers only to that volume, or to that and the second, for in the prefaces to the third and subsequent volumes several additional names are mentioned, one of them, Dr. J. Murray, being that of the author of several important articles. All of the principal contributors, except Mr. Watt (and he holds the degree of M.B.), belong to the Indian Medical Service, so that it is not surprising to find a very large space devoted to drugs and therapeutics. In fact, the whole work might fairly be termed a dictionary of economic products and materia medica. Many of the plants catalogued are apparently included solely because of some medicinal or supposed medicinal use, frequently by ignorant people. For example, on the last two pages of the work, *Zornia diphylla* is introduced on account of its use thus quoted under the head of " Medicine " : "The root is given, along with that of *Bhadar jhapni*, to induce sleep in children. These plants shutting up their leaves at night have probably suggested the idea to the Ojhas." The quotation is from a report by Mr. Campbell on the " Economic Products of Chutia Nagpur." No reference can be found to *Bhadar jhapni* in its place in the dictionary.

The " special opinions," quoted from various medical writers on therapeutics, are of a miscellaneous nature, and no distinction is drawn between notices of the purposes for which drugs are used by competent physicians, and those of occasions on which they are prescribed by ignorant hakims or superstitious herbalists. All this part of the work might have been omitted with advantage ; however useful such opinions might be in a special work on drugs and therapeutics, the details are out of place in a description of economic products. One instance may be quoted. Under the head of " Diamond," the following occurs : " *Medicine.*—Diamond dust is known to be a powerful mechanical poison. In Hindu practice it is, however, to some extent used as a drug " (just as gold, silver, pearls, and other precious substances are regarded by unscientific races as possessing great medicinal virtues). The whole extract is too long to quote, but the " special opinion " runs thus : " Employed as a poison, it is administered in the shape of dust, as in the late celebrated case when the Resident of Baroda, Sir Arthur Phayre, nearly lost his life." The Resident of

Baroda was Sir Robert Phayre, not Sir Arthur, the well-known Chief Commissioner of Burma, and the risk to life was due to an important fact which the distinguished surgeon, whose name is appended to the quotation, must have forgotten, the admixture of arsenic with the diamond dust. The latter is simply a mechanical irritant like quartz sand, or powdered glass, and to term any of these a powerful mechanical poison is to use a stronger term than is quite accurate.

The devotion of a large space to therapeutics is not the only instance in which the bulk of the work is increased by the discussion at length of matters that have but slight connection with the main subjects of the dictionary, as specified by the author. Perhaps the utilisation of several pages under *Triticum sativum* (wheat) in the discussion of the depreciation of silver, may be thought essential, but it is not clear why, under *Papaver somniferum*, long extracts should be quoted from various dispatches to illustrate the attitude of the Government of India on the Chinese opium question, nor what bearing on the economic products of India the seven pages can have, under *Vitis vinifera*, that are taken up with the history of the vine and of wine. Amongst the longer articles, 63 pages are given to tea (in addition to 19 on *Camellia theifera*), 77 to tobacco, 87 to indigo, 88 to opium, 123 to sheep, goats, wool and woollen manufactures, 152 to rice, 174 to cotton, 238 to silk and silk manufactures, and 380 to the sugar-cane and sugar. Almost every one of these articles would require a separate notice for adequate discussion. For many purposes a condensed account of the history, production, manufacture, and trade in each case would be more generally useful as well as more interesting; but, on the other hand, it is extremely difficult for the author of a work like the present to select only those data that are useful, and no editor can be expected to possess the special knowledge of every separate subject that will enable him to do justice to it, and to avoid mistakes.

In the preface to the first volume it is stated that economic products which belong to the animal and mineral kingdoms have been but very imperfectly touched upon. This plan, however, appears to have been modified subsequently, since silk and wool, as already noticed, form the subjects of two of the longest articles. The accounts of minerals have, for the most part, been written by officers of the Geological Survey, or copied from the Survey publications. It is questionable, however, if any geologist can have written the following passage under the heading of iron: "*Clay ironstone* exists in large deposits in many coal-measures, and in this situation is known as *black band*." It is, of course, only one variety that is known by this name.

No parts of the dictionary, however, stand more in need of scientific revision than those relating to vertebrate animals. A few instances will show this. A short article on "Pheasants, Jungle-fowl, Partridges, &c.," commences thus: "The pheasant families of birds, *Phasianidæ*, *Megapodidæ*, and *Gallinæ* (*sic*) comprise the pea-fowl, pheasant, jungle-fowl, and spur-fowl, while the partridge family, *Tetraonidæ*, includes the partridge, snow-cock, and certain forms of quail." A list follows in which the genera *Pavo*, *Argusianus*, and *Polyplectron* only are included in the family *Phasianidæ*, all other pheasants, amongst them the typical genus *Phasianus*, are placed with *Megapodius nicobariensis* in the family *Megapodidæ*, and the so-called family *Gallinæ* (which is really a sub-family of *Phasianidæ*) contains *Gallus* and *Galloperdix*. These mistakes are apparently copied from Murray's "Avifauna of British India." In the article "Oxen," the wild and tame yaks are rightly classed as one species, but the tame buffalo is separated, under the name of *Bubalus bos*, from the wild race, or *B. arni*. No reason is assigned for a distinction that is quite opposed to the views of all modern writers on mammalia, nor is any authority given for the name adopted, which is simply the old Linnæan name *Bos bubalus* reversed.

The omission of any notice of ngápi in its proper place has already been mentioned. This curious compound of partially decomposed fish with salt is a most important article of food in Burma, where it may be said to replace butter and cheese amongst a people, who, like the Chinese, hold milk and all substances obtained from it in abhorrence. The manufacture of ngápi is on a very large scale, and the trade in the article is extensive, yet apparently the only notice of the mode of preparation that occurs in the dictionary ("Fish," vol. iii. p. 367) is apparently erroneous, and certainly does not apply to one of the ordinary processes. Three or four different kinds of ngápi are mentioned in the *Burma Gazetteer*, and their manufacture described; all the processes are radically distinct from that briefly quoted in the dictionary, whilst no information is given in the latter as to the trade in the article or its value, except what may be inferred from the fact that the revenue from Burmese Fisheries in 1883 was twelve to thirteen lakhs of rupees.

In the article on sheep and goats, and in some others, the authorities for scientific names are quoted on the botanical, not on the zoological system, and it is rather strange to find the nilgai called *Boselaphus tragocamelus*, W. Sclater (instead of Pallas), and the Tibetan gazelle, *Gazella picticaudata*, Brooke (instead of Hodgson). The mutton of the dumba, or fat-tailed sheep, is said to be very coarse, whereas it is the best mutton in Asia. The common Indian story, repeated in the dictionary, under "Camel's milk," that the sweetmeat halwa, brought from the Persian Gulf, is composed of camel's milk and honey (vol. ii. p. 64), is a mistake. Errors like the two last (others might be quoted) are liable to occur in a work like the present, but the number of mistakes of various kinds in the articles on animals and animal products appears to be rather large. It is not easy to understand why, in an important Government work like the present, the aid of competent zoologists could not be obtained to revise the proofs.

A serious mistake may be pointed out in an article on the yeast plant, described under the somewhat pedantic heading of *Cerevisiæ fermentum*. Yeast, it is said, "lives and increases in the fermenting liquor, but appears to abstract nothing from it." This mistake may however have been noticed, for in a later article, on "Malt liquors," a correct account of the growth and nutrition of yeast is quoted.

One presumably Indian economic product, paper, can scarcely be said to be favourably represented by the material used in the present work, nor are the type and printing, especially in the later volumes, the best ever produced in India. Misprints are numerous. One is amusing: the Tibetan antelope is credited with no less than ten horns. It is to be hoped that commentators on the Apocalypse will not be led to believe that a ten-horned beast really inhabits Tibet.

On the whole, whilst in case a second edition is required, careful revision is desirable, which might in some cases take the form of abridgement and the omission of irrelevant matter, the principal feature of the work is the large amount of energy that has been expended in its preparation, and the great effort that has been made to bring together information from all quarters. To write a complete account of the products of India, and to give a full scientific and economic description, both of the products themselves and of the sources from which they are derived, are tasks far beyond the powers of any single individual, and that could only be thoroughly carried out by a committee of specialists. W. T. B.

CHINESE AND JAPANESE BUTTERFLIES.

Butterflies from China, Japan, and Corea. By John Henry Leech, B.A., F.L.S., F.Z.S., F.E.S., &c. 4to. With forty-three coloured plates. (London: R. H. Porter, 1892–1894.)

UNTIL within the last few years, almost nothing was known of the Palæarctic fauna, except that of Europe and the Mediterranean sub-region, and though butterflies are the most attractive and the easiest collected of all insects, those with which we were acquainted from Siberia, the greater part of China, and Japan, might almost have been counted on the fingers.

Since then, however, great progress has been made. In the first place, Russian exploration and consolidation have opened up vast regions of previously almost unknown parts of Asia to science, and the work begun on the Amur and in Turkestan by Schrenck and Fedchenko, has been worthily continued by the Grand Duke Nicholas Mikhailovitch and his coadjutors, among whom the brothers Groum-Grshimaïlo deserve the place of honour. When shall we see one of our own Royal Princes bringing out a work on the insects of one of our own colonies to compare with Romanoff's "Mémoires sur les Lépidoptères?" In Western Europe, such work is left to private enterprise.

The French Jesuit missionaries, especially the Abbé David, have penetrated to such out-of-the-way parts of China, as Mou-pin, and have brought back large collections of different kinds, including many very remarkable butterflies, which have been illustrated by Oberthür in his "Études d'Entomologie."

Since the time when China and Japan were thrown open to Europeans, English entomologists have not been behindhand in the work of collection and description. The fine collections formed in Japan by Lewis, Pryer, and Maries have been worked out so well by Dr. Butler and others, that the Lepidopteræ of Japan are now more thoroughly known than those of any other part of Asia except British India. The late Mr. W. B. Pryer published a work on the butterflies of Japan, in the country itself, in English and Japanese, with coloured plates of all the species known to him; but as this book is scarce, and the letterpress very meagre, we are glad that Mr. Leech has included Japan in the important work which forms the subject of the present article.

Mr. Leech commenced his entomological career by the publication of a useful little volume on British *Pyralidæ*, and by collecting excursions to the Canary Islands, Brazil, &c. Subsequently he became interested in the fauna of Eastern Asia, and devoted eight years to its study, and to the accumulation of materials for the present work, not only by employing experienced collectors like Pratt and Kricheldorf to explore the interior of China, but by personally visiting and forming large collections in the Himalayas, Corea, and Japan; in Japan, indeed, he succeeded in capturing almost every species of butterfly known to inhabit the country. By this means, he gradually accumulated the fine collections on which he has based his great work, in which he has been able fully to describe 650 species, a large proportion of which are figured in the forty-three excellent coloured plates which accompany it. We have also a map, and five plates of scenery (four of Western China and one of Japan), the second of which exhibits a side-view of the tremendous and almost perpendicular face of the mountain of Omei-Shan, in the neighbourhood of which Mr. Pratt obtained many of the most beautiful and interesting butterflies which he discovered.

The usefulness of the work is increased by an interesting introduction, dealing with the literature of the subject, the countries visited by the author and his collectors, and a table of geographical distribution, divided into the following columns: Japan, China, Corea, Amurland, Himalayas, Thibet, Europe, and "other countries and regions."

The author remarks in his preface: "It is a matter of regret that, owing to an almost complete absence of information respecting habits and life-histories of the majority of the species, the work is unfortunately less complete than the author could have wished." All honour to him for saying so. It is the duty of every entomologist to seek for and record everything of the kind which he can obtain; but entomologists are sometimes too much disposed to care only for the specimens they receive, and it would not occur to them to encourage their collectors, as they easily might do, to record anything more than dates and localities. Mr. Leech, however, seems both to have sought for and utilised such information, so far as it was accessible or obtainable.

On examining Mr. Leech's 650 species of butterflies, which are distributed among rather more than 150 genera, it becomes apparent that they are to a large extent mainly an amplification of the European fauna. About 300 species are found in Europe proper, divided into about 50 genera, of which only about 9 genera, each including but one, or at most two or three, species of very limited range, are not represented in Mr. Leech's work. These are *Triphysa*, *Nemeobius*, *Aurotis*, *Thestor*, *Zegris*, *Doritis*, *Spilothyrus*, *Thymelicus*, and *Cyclopides*; and there is no reason why some, even of these, should not extend to Western China. In China the European and Indian faunas meet and mingle; thus in the *Satyrinæ*, the Mountain Brown butterflies of the genus